ABSTRACT

AIM: To evaluate the antibacterial effectiveness of zinc oxide and magnesium oxide nano-particles with two different morphology- nanorod and nanosphere against Enterococcus faecalis.

MATERIALS AND METHODS: Zinc oxide nanorod was prepared by Hydro-thermal method and Zinc oxide nanosphere prepared by Sol-gel method. While Magnesium oxide nanorod and Magnesium nanosphere was prepared by Co-precipitation and Sol-gel method. Synthesized nanoparticles were characterised by UV-spectrophotometer, FTIR, TEM. Nanoparticles were grouped as follows: Group I-10%DMSO (negative control), Group II-ZnO-R, Group III- ZnO-S, Group IV- MgO-R, Group V- MgO-S, Group VI-3% NaOCl (positive control). The antimicrobial efficacy of nanoparticles was determined against ATCC 29212 and ORAL ISOLATE E.faecalis by Agar well diffusion assay (at five different volumes - 50,75,100,125,150µl). Broth microdilution method was chosen for determining MIC/ MBC and Time kill assay to evaluate the time needed for the nanoparticles to destroy the bacteria. The values were tabulated and subjected to statistical analysis.

RESULT: Zinc oxide nanorod was effective against both strains at 75µl. **Zinc oxide nanosphere** was effective against ATCC E.faecalis at 100 µl but was effective against oral isolate only at 150 µl. **Magnesium oxide nano-rod** was effective against ATCC at 100 µl but against oral isolate only at 125 µl. **Magnesium nanosphere** showed activity against ATCC at 125 µl but against oral isolate showed activity at 100 µl. 3% NaOCl was effective against both strains at 50 µl. **Zinc oxide nanorod** activity was on par with 3% NaOCl. Considerable antibacterial activity was present in all nanoparticles at different volumes. In Time Kill assay all the nanoparticles were effective within 15 mins against both strains except Magnesium oxide nanorod which showed bacterial growth at 15 mins against ATCC but killed the bacteria within 30 mins.

CONCLUSION: Zinc oxide nanorods exhibited good activity against both strains of E.faecalis. Considerably, all the nanoparticles were effective at different volumes and concentrations against E.faecalis. So the zinc oxide and magnesium oxide nanoparticles (nanorod and nanosphere) can provide a new horizon in the disinfection stratergy in the domain of Endodontics.

KEYWORDS: zinc oxide, magnesium oxide, nanosphere, nanorods, polar facets, ROS, alkaline effect.